We claim:

1. A process for preparing a catalyst composition for olefin polymerization, which comprises preparing a catalyst solid in a first step by bringing

A) at least one support,

B) at least one organic compound having at least one functional group containing active hydrogen,

C) at least one organometallic compound and

D) at least one organic transition metal compound

into contact with one another, then bringing this catalyst solid into contact with

E) at least one organoaluminum compound of the formula (I)

$$AlR^1R^2R^3 \qquad (I)$$

where

R^1 is C_1-C_{10}-alkyl, C_6-C_{15}-aryl, halo-C_1-C_{10}-alkyl, halo-C_6-C_{15}-aryl, C_7-C_{40}-arylalkyl, C_7-C_{40}-alkylaryl, C_1-C_{10}-alkoxy or halo-C_7-C_{40}-alkylaryl, halo-C_7-C_{40}-arylalkyl or halo-C_1-C_{10}-alkoxy and

R^2 and R^3 are identical or different and are each, independently of one another, hydrogen, halogen, C_1-C_{10}-alkyl, C_6-C_{15}-aryl, halo-C_1-C_{10}-alkyl, halo-C_6-C_{15}-aryl, C_7-C_{40}-arylalkyl, C_7-C_{40}-alkylaryl, C_1-C_{10}-alkoxy or halo-C_7-C_{40}-alkylaryl, halo-C_7-C_{40}-arylalkyl or halo-C_1-C_{10}-alkoxy,

in a second step and then using this mixture for the polymerization without further work-up.

2. A process for preparing a catalyst composition for olefin polymerization as claimed in claim 1, wherein the catalyst solid obtained by bringing the components A), B), C) and D) into contact with one another and the organoaluminum compound E) are brought into

contact with one another at from -10°C to 80°C for a period of from 0.5 minutes to 10 hours before the reaction product is used for the polymerization.

3. A process for preparing a catalyst composition for olefin polymerization as claimed in claim 1 or 2, wherein

F) at least one Lewis base

is used in addition to the components A), B), C) and D) for preparing the catalyst solid which is brought into contact with the organoaluminum compound E).

4. A process for preparing a catalyst composition for olefin polymerization as claimed in any of claims 1 to 3, wherein, in the formula (I) of the organoaluminum compound E), R^1 is C_3-C_{10}-alkyl and R^2 and R^3 are each hydrogen or C_3-C_{10}-alkyl.

5. A catalyst system for the polymerization of olefins, comprising a catalyst composition prepared as claimed in any of claims 1 to 4.

6. A catalyst system for the polymerization of olefins as claimed in claim 5 which further comprises

G) at least one further organometallic compound

as scavenger with which the monomers are brought into contact before they come into contact with the catalyst composition prepared as claimed in any of claims 1 to 4.

7. The use of a catalyst composition prepared as claimed in any of claims 1 to 4 for the polymerization of olefins.

8. The use of a catalyst system as claimed in claim 5 or 6 for the polymerization of olefins.

9. A process for the polymerization of olefins in which a catalyst composition prepared as claimed in any of claims 1 to 4 is used.

10. A process for the polymerization of olefins in which a catalyst system as claimed in claim 5 or 6 is used.